

The EpiNotes Newsletter



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	PAGE
Hepatitis C	2
Cancer clusters	5
Response to HPAI	7
Outbreak summary	8
News and Events	9
Employee of the Quarter	10
Contact Us	11

Cover: Hepatitis C virus (Courtesy of CDC)

Hepatitis C in North Carolina:

Two Epidemics with One Public Health Response

Sarah Rhea, DVM, PhD; Aaron Fleischauer, PhD; Evelyn Foust, MPH; Victoria Mobley, MD, and Megan Davies, MD.

Since 2010, the North Carolina Department of Health and Human Services (NC DHHS) has observed a 300% increase in reported acute Hepatitis C Virus (HCV) infections. This emerging epidemic among young, rural-dwelling persons who inject drugs (PWID) is coupled with the ongoing epidemic of chronic HCV infection, an illness most prevalent among persons born during 1945–1965. NC DHHS and partners are addressing these two epidemics by expanding HCV screening of high risk groups, providing prevention education, and linking infected persons to medical care and curative treatment with the goal to reduce HCV transmission and prevalence.

Hepatitis C is a contagious liver disease caused by the Hepatitis C Virus (HCV). Hepatitis C is the most common blood-borne infection in the United States and is most frequently transmitted through sharing of needles or other equipment used to inject drugs [1]. Although HCV infection can be a mild illness that lasts a few weeks (acute hepatitis C), approximately 75%–85% of infected persons will go on to develop chronic hepatitis C.

Of the estimated 3.5 million persons in the United States with chronic hepatitis C, approximately 75% were born during 1945–1965 (i.e., baby boomers) [1 - 3]. It is estimated that 50% of those with chronic hepatitis C are unaware of their infection status and do not receive recommended medical care and treatment. Without treatment, chronic hepatitis C can progress to liver disease, liver

cancer, and death [1, 2]. In addition to the ongoing chronic hepatitis C epidemic, an emerging epidemic of acute hepatitis C has been recognized among young PWIDs, many of whom reside in rural, resource-poor areas with higher unemployment [4].

Opioid injection is on the rise in the United States; since 2000, a 200% increase in injection drug use fatalities has been reported [5]. Likewise, in North Carolina, opioid and heroin-related hospitalizations and fatalities have increased 3-fold during the past 10 years [6].

As part of statewide communicable disease surveillance, acute hepatitis C cases are reportable by law to the North Carolina Department of Health and Human Services [7]. North Carolina has experienced an approximately 3-fold increase in reported acute hepatitis C cases during the past 5 years, from 39 during 2010 to 113 during 2014 (Figure 1)¹.

Of 113 acute hepatitis C cases during 2014, a total of 54 (47.8%) were aged ≤30 years (Table 1). Of the 50 acute hepatitis C cases during 2014 with complete exposure and risk factor information, 42 (84%) indicated injection drug use was the most likely exposure (Table 1). County-specific acute HCV incidence rates were consistently highest in western North Carolina during 2010–2014, followed by southeastern North Carolina (Figure 2). Considering the variability of symptomatic illness,

lack of a specific diagnostic test for acute hepatitis C, and possibility of underreporting, acute hepatitis C cases are likely underestimated by at least a factor of 14 [8,9]. In other words, it's reasonable to extrapolate that as many as 1,582 acute hepatitis C infections may have occurred in 2014.

Chronic hepatitis C cases are not currently reportable by law in North Carolina. Therefore, national disease prevalence projections are used to estimate the burden of chronic hepatitis C in North Carolina. With a projected hepatitis C prevalence of 1.1%, approximately 110,000 North Carolinians are estimated to be infected [1, 3, 10].

Notably, the incidence rate of liver cancer, an outcome of chronic hepatitis C, has also increased in North Carolina. The statewide age-adjusted incidence rate was 4.2 cases/100,000 persons during 2003 and 8.0 cases/100,000 persons during 2013, the most recent year that data are available (Figure 3).

NC DHHS is addressing hepatitis C by establishing new partnerships with health care providers and other stakeholders from across the state with a focus on hepatitis C screening, prevention education, and linkage to medical care and curative treatment. The project, called hepatitis C Test, Link and Cure (TLC) will enhance screening and testing capacity in high risk regions of the state and link infected persons to medical care and treatment to cure the disease. The goal of these collaborative

efforts is to reduce hepatitis C transmission and prevalence in North Carolina.

References:

1. Denniston MM, Jiles RB, Drobeniuc J, et al. Chronic hepatitis C virus infection in the United States, National Health and Nutrition Examination Survey 2003 to 2010. *Ann Intern Med* 2014;160(5):293–

2. Centers for Disease Control and Prevention. Recommendations for the Identification of Chronic Hepatitis C Virus Infection Among Persons Born During 1945–1965. *MMWR Morb Mortal Wkly Rep*. 2012;61(RR-04);1–18.
3. Edlin BR, Eckhardt BJ, Shu MA. Toward a more accurate estimate of the prevalence of hepatitis C in the United States. *Hepatology*. 2015;62(5):1353–

300. doi: 10.1002/hep.27978.

4. Zibbell JE, Iqbal K, Patel RC, et al. Increases in hepatitis C virus infection related to injection drug use among persons aged ≤30 years—Kentucky, Tennessee, Virginia, and West Virginia, 2006–2012. *MMWR Morb Mortal Wkly Rep*. 2015;64(17):453–458.
5. Rudd RA, Aleshire N, Zibbell JE, Gladden RM. Increases in drug and opioid overdose deaths—United States, 2000–2014. *MMWR Morb Mortal Wkly Rep*. 2016;64(50–51):1378–1382
6. Injury and Violence Prevention Branch, North Carolina Department of Health and Human Services. County level poisoning data. <http://www.injuryfreenc.ncdhhs.gov/DataSurveillance/Poisoning.htm>. Accessed January 21, 2016.
7. North Carolina General Statute (G.S.) 130A-134: Article 6. Communicable Diseases. Reportable diseases and conditions. http://www.ncga.state.nc.us/enactedlegislation/statutes/pdf/byarticle/chapter_130a/article_6.pdf. Accessed January 15, 2016.
8. Onofrey S, Aneja J, Haney GA, et al. Underascertainment of acute hepatitis c virus infections in the U.S. surveillance system: a case series and chart review. *Ann Intern Med*. 2015. doi: 10.7326/M14-2939.
9. Centers for Disease Control and Prevention. Viral hepatitis-statistics & surveillance. <http://www.cdc.gov/hepatitis/statistics/index.htm>. Accessed January 21, 2016.
10. U.S. Census Bureau. State and County Quick Facts—North Carolina. <http://quickfacts.census.gov/qfd/states/37000.html>. Accessed January 21, 2016.

Figure 1. Acute Hepatitis C Case Reports, North Carolina—2000 to 2014.

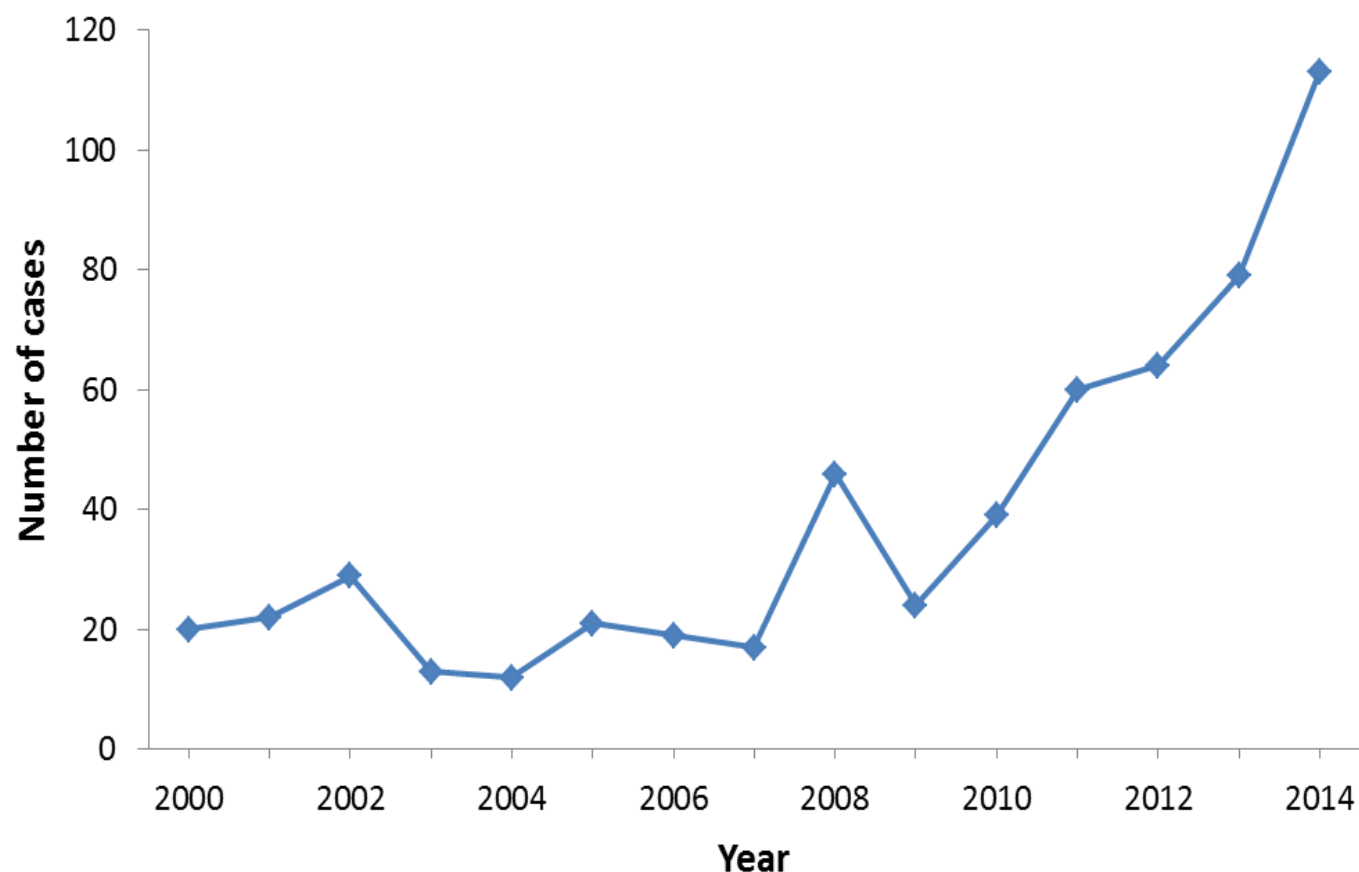


Figure 2. Rates of reported Acute HCV cases by county, North Carolina, 2010–2014.

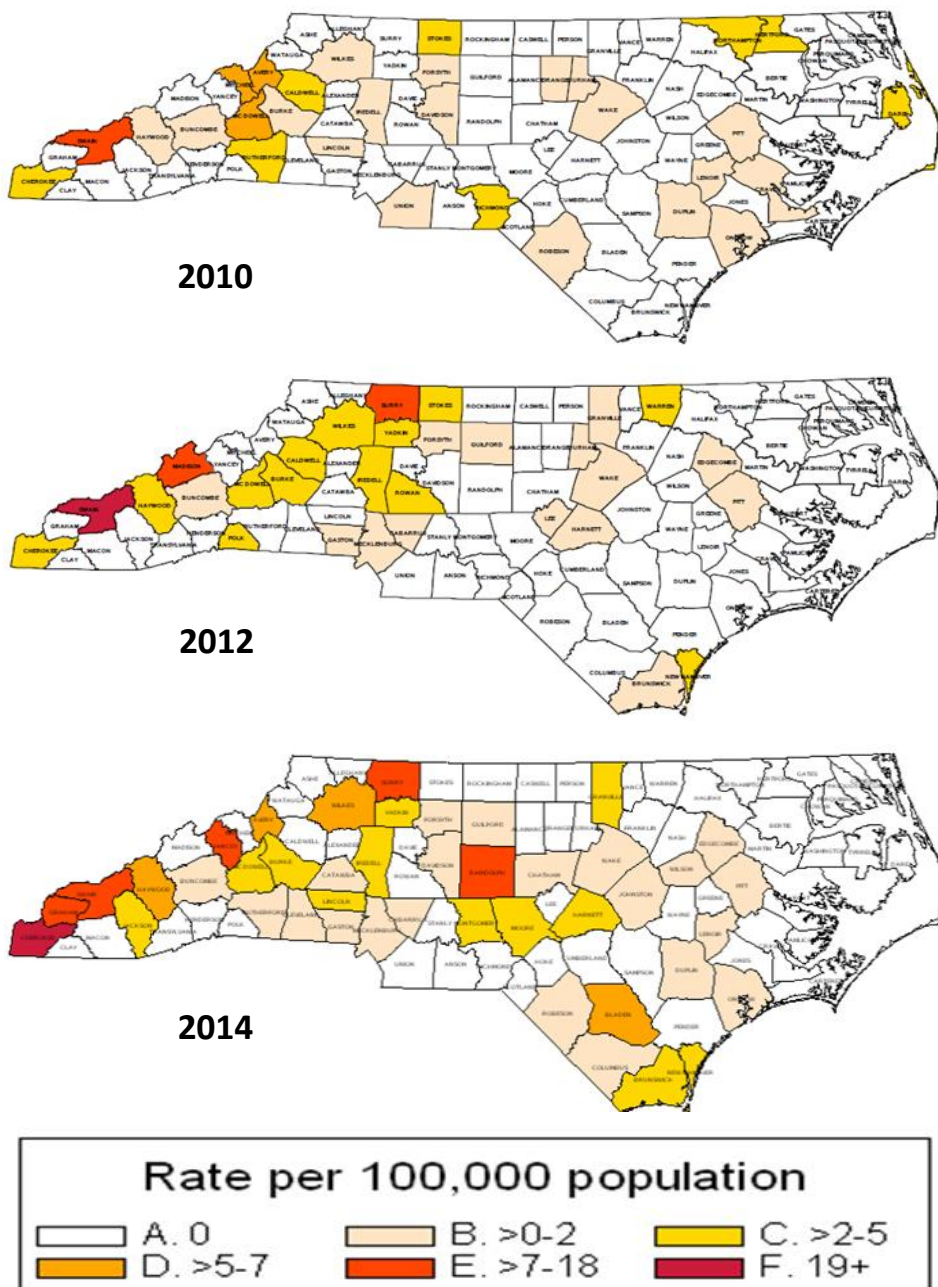
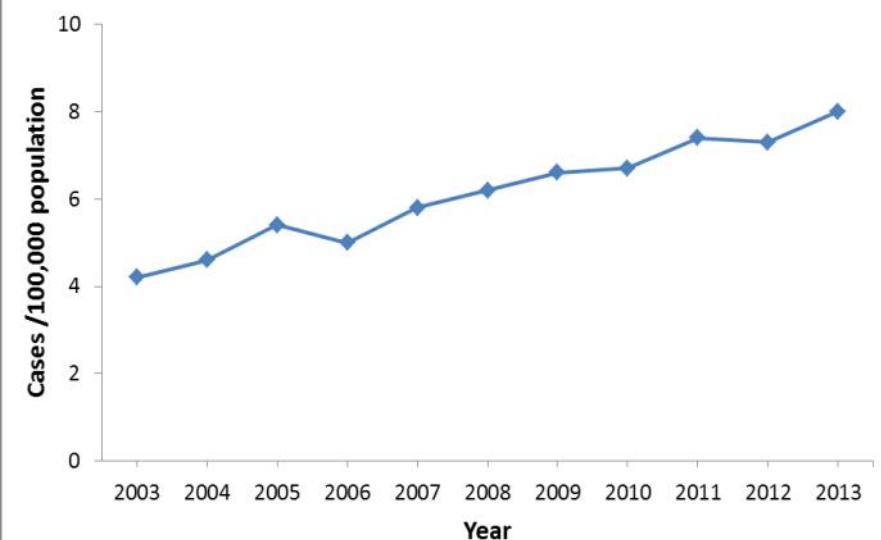


Table 1. Demographics and risk factors among Acute HCV cases in North Carolina—2014.

Characteristic	N=113 (%)
Race/Ethnicity:	
White	96 (85%)
Black	5 (4%)
Hispanic	3 (3%)
Other	9 (8%)
Age (years):	
≤20	7 (6%)
21-30	47 (41%)
31-40	27 (24%)
41-50	21 (19%)
>50	11 (10%)
Gender:	
Male	60 (53%)
Female	51 (45%)
Missing	2 (2%)
Risk Factors*:	
Injection drug use	42 (37%)
Multiple sex partners	5 (4%)
MSM	2 (2%)
Blood transfusion	1 (1%)
Missing data	63 (56%)

*Number of persons who endorsed each risk factor

Figure 3. Incidence of liver cancer, North Carolina—2003 to 2013.



Cancer Cluster Investigations: What is the Role of the Occupational and Environmental Epidemiology Branch?

By Annie Hirsch, MPH; Ricky Langley, MD; and Mina Shehee, PhD



The complex nature of cancer makes it inherently challenging to identify, interpret, and address cancer clusters. Confirmation of a cancer cluster does not necessarily mean that there is any single, external exposure or hazard that can be adequately identified and remediated. In most circumstances, a cancer cluster could be the result of any of the following:

- chance
- not considering a risk factor within the population at risk when calculating the expected number of cancer cases
- differences in the case definition between observed cases and expected cases

- known causes of cancer (e.g., smoking)
- geographic clustering of persons with identified risk factors for certain cancers
- unknown cause(s) of cancer.

Follow-up investigations can be performed, but can take years to complete and the results are generally inconclusive (i.e., usually no cause is found).

When a citizen notifies the Division of Public Health or their local health department of a suspected cancer cluster in their community, the Central Cancer Registry conducts a standard cluster analysis at the county level and sends a summary report to the citizen. Typically, the report describes the calculation of the age-adjusted rate of the specific cancer and whether this rate is statistically elevated compared to the overall average state rate. If the Registry's report demonstrates a county rate at or below the expected rate, the investigation usually ends there. Occasionally, the county rate is statistically elevated; in which case an epidemiologic investigation may be warranted. However, often there are requests from community members and politicians to investigate even if the cancer rate is not elevated. In these cases, the Occupational and Environmental Epidemiology Branch (OEEB) may decide to conduct an epidemiologic investigation of environmental factors in the community.

An epidemiologic investigation into a suspect cancer cluster may include the following steps typically conducted by OEEB staff:

1. Review the scientific literature for known or suspected risk factors (i.e., etiologies) specific to the cancer under question.
2. Request experts at CDC to conduct an inde-

pendent literature review.

3. Assess environmental concerns expressed by cancer cases and their families, such as hazardous waste sites, air pollution, or radiation. Depending on the site of concern, this may include looking up school inspection and asbestos records, obtaining county radon levels, and determining the water source (public, private well or community well).
4. Create a map showing potential environmental hazards (such as hazardous waste sites and nuclear power plants) in the area of concern and their location in relation to the cases' homes and schools. OEEB staff may then conduct a site visit to look for obvious potential environmental issues in or near the community. *Site visits are for observational purposes only and do not include systematic environmental sampling.*
5. Obtain information from the Department of Environmental Quality (DEQ) on hazardous waste sites (both active and inactive) or leaking underground storage tanks in the community.

If an epidemiologic study is warranted, OEEB may:

1. Design and administer a questionnaire to cases within the suspect cancer cluster and/or their family members to collect additional information that is not collected by the Central Cancer Registry. This could include questions about demographics, medical history, occupational history of the cases and their family, and exposure to the risk factors identified in the literature.
2. Encourage cases to participate in any research studies being conducted at nearby medical centers (if applicable).
3. Make general environmental recommenda-

tions to the community, such as recommending that residents test their homes for radon and routinely test private wells for contaminants.

However, community members often ask OEEB to go beyond these steps and provide additional services that are either not warranted or are beyond the capacity of OEEB. Often, one such request is for OEEB to conduct environmental sampling of the air, soil, and water in the community. This is generally not feasible, as there are often few identified risk factors in the literature for rare cancers, nor is there laboratory capacity to test these environmental samples.

For example, if no soil contaminants have been linked to the cancer of concern, it would not be scientifically sound for OEEB to perform environmental testing of the soil in the community. However, OEEB can review sampling records from DEQ, such as public water supply testing results, and summarize this information for the community.

In addition, OEEB does not have the resources to conduct a research study to identify causal associations. This type of study would have to be done at an academic medical center or university. OEEB is limited to investigating risk factors that have already been identified in the scientific literature.

Cancer cluster investigations involve a number of challenges, including the following:

- A suspected cancer cluster often involves a small number of cases, which makes statistical analyses less precise.
- Cancer rates are usually calculated at the coun-

ty level in order to include enough cases to calculate stable and reliable rates, even though the suspected cluster is often confined to a single town or neighborhood.

- Community members concerned about a suspected cluster often fail to account for the latency period of the cancer. The time period from exposure to a carcinogen to the development of cancer is often 10–20 years or more, while the exposure of concern to a community

“It is fair to state that extensive efforts to find causes of community cancer clusters have not been successful.”

(such as several cases attending the same school) has typically occurred much more recently.

- Many people in our society move several times throughout their lives. If environmental factors did play a role in the development of the cancer cases in a suspected cluster, the exposures may have occurred long before the cases moved to their current community.
- Unfortunately, cancer is extremely common in our society. One in two men and one in three women will be diagnosed with cancer during their lifetime [1]. In addition, there are many types of cancer, and each is a separate disease with unique risk factors, including genetics and

environmental exposures. Furthermore, there are few clinical or molecular tests available that can determine the cause of cancer.

- Cancer cases are not evenly distributed throughout the state. As a result, grouping of cases can occur by chance, leading to the appearance of an environmental link, when in reality, none exists.

A recent study reviewed 428 cancer cluster investigations in the U.S. during the past 20 years and found that only one investigation revealed a clear cause [2]. The study concluded, “It is fair to state that extensive efforts to find causes of community cancer clusters have not been successful.”

Although OEEB investigations of suspected cancer clusters are extremely unlikely to identify an environmental cause for the cancer cases, it is likely that community members and politicians will continue to request these investigations. Cancer cluster investigations are time-consuming and often last more than a year, but OEEB is committed to communicating regularly with citizens throughout an investigation and working closely with local health departments and communications staff to ensure that investigation findings are communicated as quickly and transparently as possible.

References:

1. American Cancer Society. Lifetime Risk of Developing or Dying From Cancer. Available at: <http://www.cancer.org/cancer/cancerbasics/lifetime-probability-of-developing-or-dying-from-cancer>.
2. Goodman M, Naiman JS, Goodman D, LaKind J. Cancer clusters in the USA: what do the last twenty years of state and federal investigations tell us? *Critical Reviews in Toxicology*. 2012;42:474-490.

Preparedness for Highly Pathogenic Avian Influenza.

By Julie Casani, MD



In 2015, two large outbreaks of Highly Pathogenic Avian Influenza (HPAI) A H5 occurred in egg-laying hens and turkeys in Iowa and Minnesota. The outbreak led to de-population of over 49.5 million birds at a cost of over \$1.6 billion to the industry and \$3.3 billion to the economy overall. There were no human cases in either of the two outbreaks.

North Carolina's poultry industry is estimated at \$34.4 billion and accounts for about 109,000 jobs. The NC Department of Agriculture and Consumer Services (NC DA&CS) has developed comprehensive plans to identify premises that may be infected. For example, the farm would be isolated and a area around that premise would also be contained from transporting birds out of the affected zone. Depopulation of the affected flock would be performed followed by cleanup and composting of carcasses.

North Carolina Public Health's activities are two-fold in these scenarios: protection of the worker during the depopulation activities and subsequent health monitoring (i.e., surveillance) of workers and the surrounding community.

Protection of workers includes participation in health and safety training. Workers and responders will wear protective equipment (PPE), based on their work activities and proximity to sick birds. Respiratory protection for HPAI includes N95 respirators. Fit testing has and will be performed by PHP&R's Industrial Hygienists providing surge capacity at several NC DA&CS training events. Local Health Departments have also stood up surge capacity for just in time fit testing. Heat stress and other medical monitoring will be conducted on site by the NC Office of Emergency Medical Services.

Guidance for post-deployment monitoring:

- Conduct symptom monitoring of exposed workers/responders. Symptom and temperature logs with instructions will be distributed to workers during demobilization from their last assignment.
- Conduct an intake interview of exposed persons and establish points of contact.
- Perform risk assessments based on use and integrity of personal protective equipment (PPE) during contact with the contaminated environment.
 - ☞ If there is no breach of proper PPE, the worker will be able to self-monitor for symptoms and will be instructed to call the Health Department if symptoms develop.
 - ☞ If there is an identified breach of PPE, daily contact between the worker and

the Health Department will allow for early evaluation and medical intervention.

- Coordinate evaluation, testing, and decisions regarding post-exposure treatment in the event that a worker/responder develops symptoms.

Based on experiences in Minnesota and Iowa, PHP&R has also collaborated with Division of Social Services and Division of Mental Health, Developmental Disabilities and Substance Abuse Services to provide mental/behavioral health and social service support to the affected communities.

Environmental concerns regarding persistence of the virus, food safety and safe disposal of the waste have also been addressed through collaboration with NC DA&CS and Department of Environmental Quality. Messages are being prepared for dissemination to inform and reassure the public.

While no cases of human infection with this strain of HPAI have occurred, H7 strains have caused human illness in other parts of the world. Even in the absence of human infection, health and medical support of the workers during the stresses of depopulation and clean up activities will require a significant effort on the part of local and state public health.

References:

USDA guidance on HPAI available at: http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=avian_influenza.html.

CDC guidance on HPAI available at: <http://www.cdc.gov/flu/avianflu/index.htm>.

A Descriptive Summary of Outbreaks in North Carolina: 2012–2014.

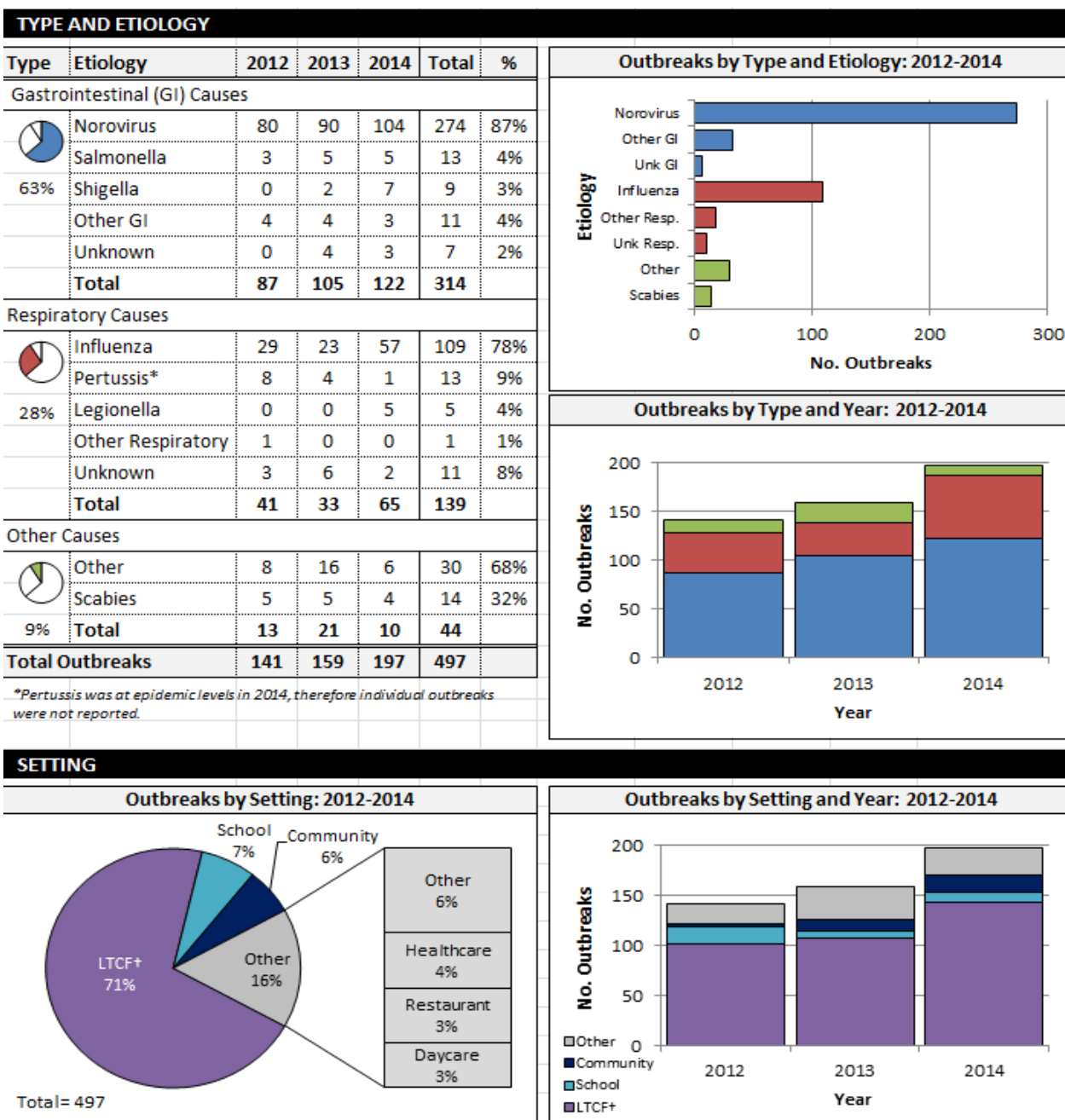
By Communicable Disease Branch

A total of 497 outbreaks were reported to the Communicable Disease Branch (CDB) from January 1, 2012 -December 31, 2014; an average of 166 outbreaks per year. Details of those outbreaks are presented below.

As required by North Carolina Administrative Code (10A NCAC 41A .0103), local health departments must submit a written report of the investigation within 30 days of the end of the outbreak. Outbreak reports were received for 78% of 2012 outbreaks, 91% of 2013 outbreaks and 61% of 2014 outbreaks. The median time to report receipt by the CDB from initial outbreak notification was 55 days in 2012, 27 days in 2103 and 129 days in 2014.

During 2014, a total of 197 communicable disease outbreaks were reported to local health departments and NC DPH (Table 1). While it appears that there was increase in the number of outbreak reports during this 3-year timeframe, the increase is likely a result of better outbreak reporting to and from local health departments. Most of these outbreaks were norovirus or influenza associated outbreaks in long-term care facilities, and a result of a general statute requiring long-term care facilities to report any outbreak among residents and/or staff to their local health department.

Table 1. Communicable disease outbreaks reported to NC DPH during 2012-2014 by syndrome type, specific illness (i.e., etiology) and setting.



NEWS

Zika Virus Disease Testing Recommendations

By Jess Rinsky, PhD

Public health authorities are responding to an ongoing epidemic of Zika virus disease in Central and South America and the Caribbean. Zika is spread primarily through the bite of Aedes species mosquitoes, although transmission through sexual contact and blood transfusion have also been reported. No mosquito-borne transmission has been reported in the continental U.S. As of February 24, 2016, 107 travel-associated cases of Zika virus disease have been diagnosed in the continental U.S.

Zika virus disease is a mild, self-limiting disease. Symptoms occur in approximately 1 in 5 persons infected and include fever, rash, conjunctivitis, joint pain, headaches and fatigue. Countries with ongoing transmission of Zika virus have reported possible increases in the number of babies born with congenital microcephaly and other poor pregnancy outcomes, and in the number of cases of Guillain-Barré Syndrome. The link between Zika virus disease and these outcomes is currently under investigation.

Zika testing is recommended for:

- Persons presenting with symptoms consistent with Zika virus disease within two weeks of travel to an area with ongoing transmission, or after condomless sex with a male partner who has had symptoms of Zika virus disease during travel or within two weeks of return from an

area of ongoing Zika virus transmission.

- Asymptomatic pregnant women who have ultrasound findings of fetal microcephaly or intracranial calcifications and who report travel to an area with ongoing transmission during pregnancy.

Serologic testing can be offered to asymptomatic pregnant women 2–12 weeks after return from travel to areas of ongoing Zika virus transmission. Testing can also be offered to asymptomatic pregnant women who have had condomless sex with a male partner who has had symptoms of Zika virus disease during travel or within two weeks of return from an area of ongoing Zika virus transmission.

Consultation and approval from the Communicable Disease Branch is required to obtain Zika virus testing. Local health departments should utilize integrated mosquito management to facilitate mosquito education, surveillance, and control. Guidance is available at <http://epi.publichealth.nc.gov/cd/diseases/zika.html> or by contacting the NC DPH on-call epidemiologist at 919-733-3419.



7th ANNUAL COMMUNICABLE DISEASE CONFERENCE

**GROWING
DEEP ROOTS and STRONG
BRANCHES**

MONDAY-WEDNESDAY
APRIL 25-27, 2016

Join us for the 7th Annual Communicable Disease Conference. This conference will provide a forum for local and state public health partners to discuss epidemiology, prevention and control of diseases. A choice of workshop sessions will be available for practical smaller group discussions which will allow sharing of ideas, data, insight, models and methods.

Join us in Asheville!

Monday, April 25th
Registration: 11:00am - 12:30pm
Program: 12:30pm - 5:00pm

Tuesday, April 26th
Registration: 7:30am - 9:00am
Program: 9:00am - 5:15pm

Wednesday, April 27th
Registration: 8:00am - 9:00am
Program: 9:00am - 12:00pm



Pictured from L-R: Drs. Davies, Casani, Brian Combs, Drs. Langley and Shehee

Employee of the Quarter: **Dr. Ricky Langley and Brian Combs**

Dr. Ricky Langley from the Occupational and Environmental Epidemiology Branch (OEEB) and Mr. Brian Combs from the Office of Public Health Preparedness and Response (PHPR) have been nominated for their outstanding leadership and teamwork for the development of public health response to chemical incidents for the state. Using a legislative requirement in the wake of a chemical facility fire as a base, they worked together to create a comprehensive chemical public health statewide plan and implement the training of regional staff about this plan. Through

their low key, but effective leadership, they fostered a culture of competent and professional response capabilities in OEEB.

Brian and Ricky work well together and are able to bring in others, as appropriate, into preparedness and response activities and actions. Their efforts enhanced support of local health departments and other health agencies during chemical incidents.

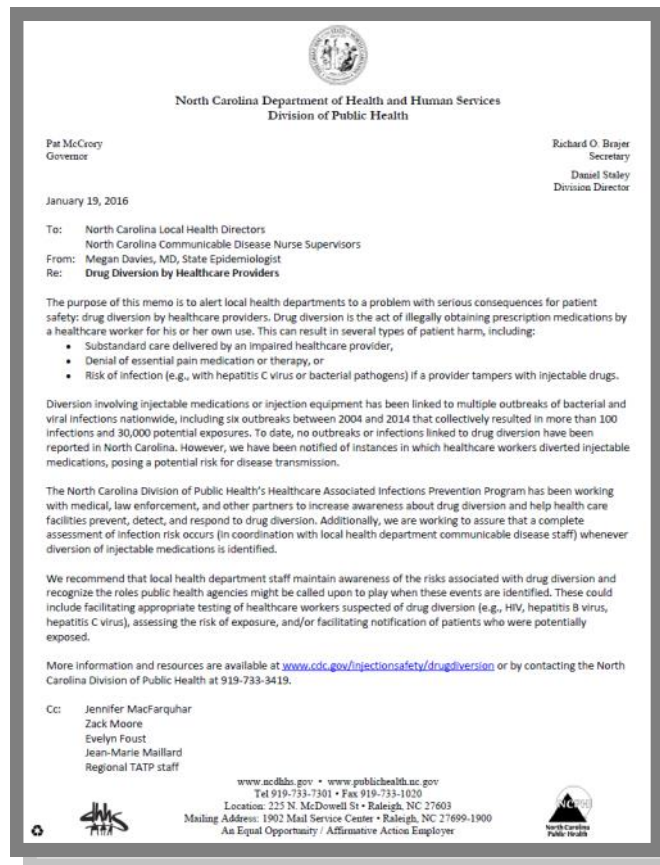
Their leadership and

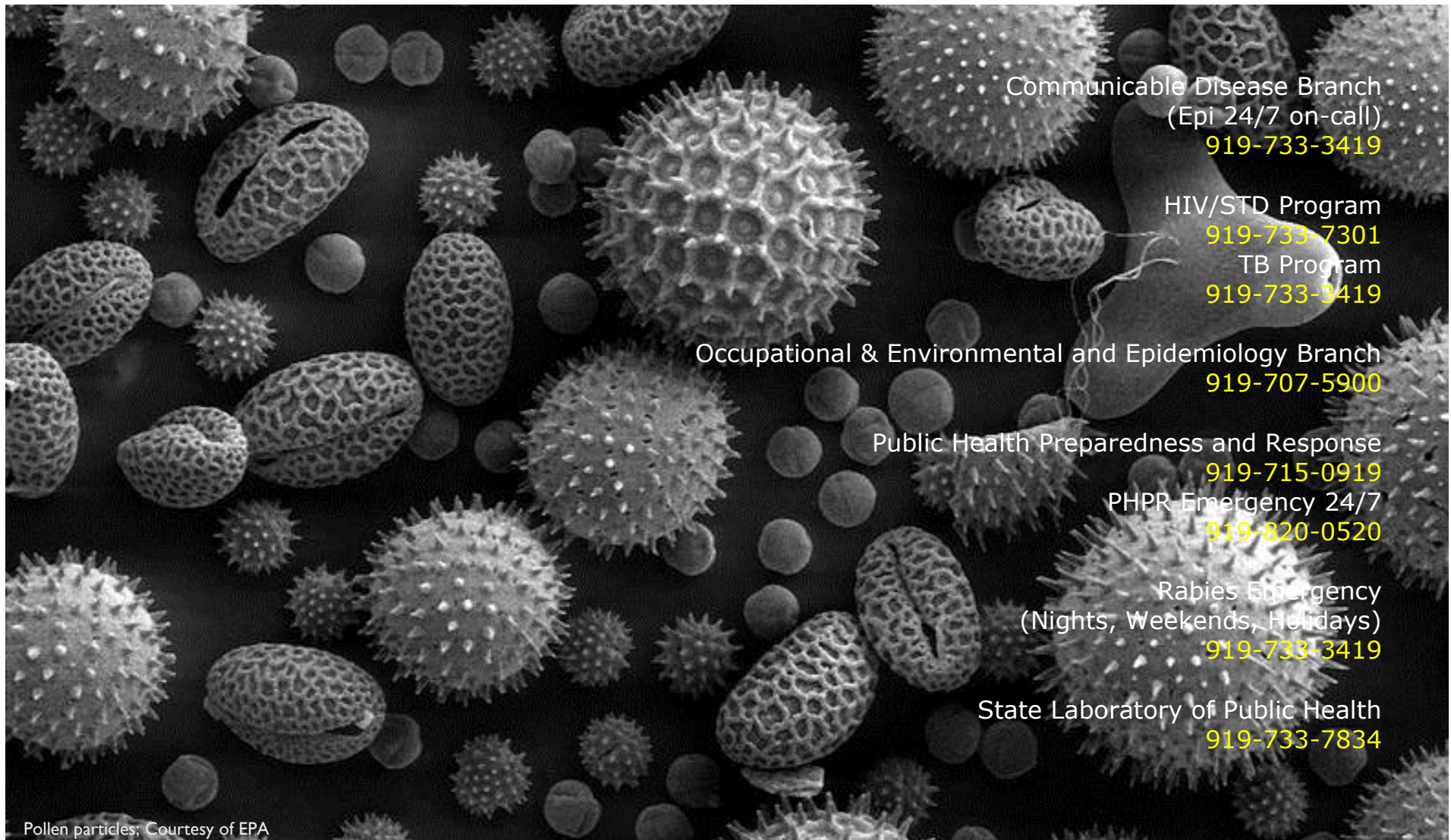
teamwork were exemplified during North Carolina's response to Ebola during the fall of 2014. They worked together to coordinate and craft the NC guidance and plans for worker safety and the multiagency plan for decontamination and cleanup of residences. They brought together a branch team to create systematic and comprehensive plans for the state when no federal guidelines were available.

Ricky and Brian were recently recognized for their work with environmental issues surrounding Ebola waste. They were the only state public health representatives invited to attend the Water Research Foundation workshop in May 2015 to create a national protocol to handle wastes from Ebola and other emerging infectious agents in wastes and ways to protect people and workers from exposure to these microorganisms. It was through their diligence and leadership that earned them this national recognition.

Drug Diversion by Healthcare Providers

When prescription medicines are obtained or used illegally, it is called drug diversion. Addiction to prescription narcotics called opioids has reached epidemic proportions and is a major driver of drug diversion. Recently, the NC DPH has begun working with partners focusing on diversion by healthcare providers - those who steal controlled substances for their own use. Read more in the memo to local health departments below and on our website: http://epi.publichealth.nc.gov/cd/injection_safety/providers.html.





Pollen particles; Courtesy of EPA

Communicable Disease Branch
(Epi 24/7 on-call)
919-733-3419

HIV/STD Program
919-733-7301
TB Program
919-733-3419

Occupational & Environmental and Epidemiology Branch
919-707-5900

Public Health Preparedness and Response
919-715-0919
PHPR Emergency 24/7
919-820-0520

Rabies Emergency
(Nights, Weekends, Holidays)
919-733-3419

State Laboratory of Public Health
919-733-7834

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